

REMARKS/ARGUMENTS

Claims 1-28, 55-65, and 69-74 are pending and stand rejected. Claims 1, 5-8, 12, 18-21, 55, 57, 59-61, 63, and 69 have been amended. Reconsideration is respectfully requested.

1. Rejection of Claims 1-11 and 55-65 Under § 102(e)

Claims 1-11 and 55-65 stand rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent 6,262,917 (Lee).

It is respectfully submitted that independent claims 1, 55 and 61 (as amended) are not anticipated by Lee. Specifically, independent claims 1 and 61 recite that the floating gate is disposed “over at least a portion of the channel region and a portion of the first region”. Likewise, claim 55 recites that the floating gate has a first end “disposed over and insulated from the first region”. In contrast, the floating gate 204 of Lee is not disposed over drain region 214b (see Fig. 2F). In addition, these independent claims all recite “insulation material disposed between the floating gate and the control gate and having a thickness permitting Fowler-Nordheim tunneling of charges therethrough”. In contrast, Lee fails to teach that dielectric layer 218 (between floating gate 204 and conductive layer 220) has a thickness permitting Fowler-Nordheim tunneling. In fact, Lee teaches away from the claimed thickness as evidenced by the operation of the Lee device. Specifically, Lee teaches that erasure is performed by grounding all components except for the substrate, which is held at a high voltage (>15V, see Table 2). This clearly indicates to one in the art that tunneling occurs through oxide layer 202, not through dielectric layer 218. Thus, for proper operation, dielectric layer 218 would not have a thickness permitting Fowler-Nordheim tunneling therethrough. Lastly, claim 55 recites that the floating gate includes “a sloping upper surface that terminates in a sharp edge that extends toward the control gate.” Lee fails to teach or suggest a sloping upper surface on floating gate 204. For these reasons, it is respectfully submitted that independent claims 1, 55 and 61 are not anticipated by Lee.

Claims 2-11, 56-60 and 62-65 depend from claims 1, 55 and 61, and are considered allowable for the reasons set forth above. In addition, it is submitted that Lee fails to teach elements of these dependent claims. For example, claims 5 and 63 recite that the channel region second portion *extends from the channel region first portion to the first region*, and the floating gate is disposed *over the entire second portion of the channel region*. In contrast, Lee shows the floating gate offset from the trench, and therefore not disposed entirely over the channel region second portion (i.e. there is a portion of the substrate surface and the underlying channel region that is not overlapped by the floating gate). Claim 6 (as amended) recites that the floating gate includes “a sloping upper surface that terminates in a sharp edge that extends toward the control gate.” In contrast, Lee shows floating gate 204 with a planar surface. Claims 9, 57 and 64 recite the channel region first portion extending in a direction “directly toward the floating gate”. Instead, Lee teaches the control gate extending out and over a portion of the substrate surface (see Fig. 2F) with the floating gate offset away from the edge of the trench, so that the vertical portion of the channel extends in a direction directly toward the control gate (and not the floating gate).

For these reasons, the Applicants respectfully submit that claims 1-11 and 55-65 are not anticipated by Lee, and that this rejection should be withdrawn.

2. Rejection of Claims 12-28 and 69-74 Under § 103(a)

Claims 12-28 and 69-74 stand rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 4,905,062 (Esquivel) in view of Lee. It is respectfully submitted that these claims are not rendered obvious for reasons paralleling those stated above with regard to claims 1-11 and 55-65, in that Lee fails to teach or suggest certain claim elements, and that Esquivel fails to cure the deficiencies of Lee.

To establish prima facie obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974); MPEP 2143.03. Further, there must be something in the prior art as a whole to suggest

the desirability, and thus the obviousness, of making the combination. Lindemann Maschinenfabrik GmbH v. American Hoist and Derrick Co., 730 F.2d 1452, 1462, 221 U.S.P.Q. 481, 488 (Fed. Cir. 1984).

It is submitted that Lee fails to teach or suggest that the floating gate is disposed over a portion of the first region as recited in independent claims 12 and 69 (see discussion above regarding claims 1, 55, 61). Lee also fails to teach or suggest insulation material disposed between the floating gate and the control gate having a thickness permitting Fowler-Nordheim tunneling of charges therethrough as recited in independent claims 12 and 69 (see discussion above regarding claims 1, 55, 61). It is also respectfully submitted that Esquivel fails to cure these deficiencies of Lee, and therefore claims 12 and 69, as amended, are not rendered obvious over Lee and Esquivel.

Claims 13-28 and 70-74 depend upon claims 12 and 69, and are considered allowable for the reasons set forth above. In addition, it is submitted that Lee and Esquivel fail to teach or suggest elements of these dependent claims. For example, Lee and Esquivel fail to teach or suggest that the floating gate includes a sloping upper surface that terminates in a sharp edge that extends toward the control gate, as recited in claim 19 (see discussion above regarding claim 55). Lee and Esquivel also fail to teach or suggest that the channel region first portions extend in a direction "directly toward the floating gate", as recited in claim 24 (see discussion above regarding claims 9, 57 and 64).


For these reasons, the Applicants respectfully submit that claims 12-28 and 69-74 are not unpatentable over Esquivel and Lee, and that this rejection should be withdrawn.

It is respectfully submitted that the claims are in an allowable form, and action to that end is respectfully requested.

Respectfully submitted,

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